at. In this connection, it may also be noted that in the year 1886 the Thames water at Hampton contained twenty times as many microbes in the winter as were found in the summer months. Here again the consideration of other agencies also tending to influence the bacterial condition of the river water cannot be excluded, but sunshine undoubtedly assisted in the banishment of the microbes. G. C. FRANKLAND.

NOTES.

THE Municipal Council of Paris has opened competitions for the best means of suppressing or diminishing the smoke of cities, and of purifying water. To the author of the best memoir on the former subject, the sum of ten thousand francs will be given, and two other prizes will be awarded of five thousand and two thousand francs respectively. The memoirs must be sent in before November 1. Prizes varying from one thousand to three thousand francs will be awarded for the processes of water purification which give the best results. Papers relating to this must reach the Council before September 15.

THE death is announced of Dr. Karl Neumann, Professor of Chemistry in Zürich Polytechnic School, at the age of forty-three.

WE learn from the *Athenæum* that Father Epping, S.J., died on August 22. He was one of the highest authorities on Assyrian astronomy and chronology, on which subject he published, in conjunction with Father Strassmaier, a valuable treatise some years ago.

THE tenth International Congress of Orientalists was opened at Geneva on Tuesday. Fourteen Governments, and ninety-seven Universities or learned societies, have sent delegates to the meeting.

THE International Congress of Hygiene and Demography is now being held at Budapest. We hope to give a report of the proceedings after the meeting has ended.

THE Association Géodésique Internationale met at Innsbruck yesterday. M. Faye, M. Bouquet de la Grye, and M. Tisserand were delegated by the Paris Academy of Sciences to attend the meeting.

THE International Meteorological Committee held its meeting, as arranged, at Upsala, August 20-24. M. Wild, the president, was unfortunately prevented from attending, owing to indisposition. M. Mascart was elected president for the meeting, and Mr. Scott, as usual, secretary; the other members present were Prof. v. Bezold (Berlin), Dr. Billwiller (Zürich), Mr. W. G. Davis (Cordoba), Dr. Hann (Vienna), M. Hepites (Bucharest), Dr. Hildebrandsson (Upsala), Prof. Mohn (Christiania), Dr. Paulsen (Copenhagen), M. Snellen (Utrecht), and Prof. Tacchini (Rome); the absentees were, in addition to the president, Admiral de Brito Capello (Lisbon), owing to health, and Messrs. Eliot (Simla), Ellery (Melbourne), and Harrington (Washington), owing to distance. The principal points dealt with at the meeting were as follows:—(1) The establishment of an International Meteorological Bureau was recognised as impracticable. (2) It was resolved to publish in the report of the meeting a *résumé* of the measures adopted in all countries to communicate to agriculturists meteorological results likely to be useful to them. (3) The acceleration of meteorological telegrams. It was decided to address the International Telegraphic Bureau at Berne on this subject. (4) The scintillation of stars as an indication of weather. A paper by M. C. Dufour will be reproduced in the report. (5) The study of clouds. This was the *pièce de résistance* at the meeting. The Cloud Committee, appointed at Munich in 1891, held a meeting at the same time as the International Meteorological Committee, and presented a report dealing with definitions for the ten classes (Hildebrandsson and Abercromby) adopted at Munich, and with instructions for cloud observations. They also proposed to prepare and issue an authoritative cloud atlas. This report was carefully discussed and, after modification, adopted. The members of the Cloud Committee who were present at the meeting, were Prof. Hildebrandsson, Dr. Hann, Prof. Mohn, Mr. A. L. Rotch (Blue Hill Observatory), M. Teisserenc de Bort. In addition, the following gentlemen were admitted, but without voting power: Prof. v. Bezold, Dr. Billwiller, and Mr. Davis (of the International Meteorological Committee), and Prof. Broounof (Kieff), Dr. Fineman and Dr. Hagström (Upsala), Prof. Riggenbach (Basle), Prof. Sprung (Potsdam), and M. Philip Weilbach (Copenhagen). (6) The subject of the treatment of the wet bulb below the freezing point was discussed, and the use of Ekholm's formula was recommended *ad interim*. (7) It was decided to arrange for a conference of the same character as that at Munich in 1891, which was not an official congress, to be held in Paris in September 1896. M. Mascart and Mr. Scott were requested to make the necessary preparations, such as the arrangement of the programme, &c.

THE great pine forest region in the States of Minnesota and Wisconsin has been devastated by fire. There had been no rain in the district for nine weeks, and the trees had therefore become very dry and inflammable. Forest fires occurred in the early part of last week, but their advance was checked. On Friday, however, several fires broke out almost simultaneously, and the flames spread with alarming rapidity. Many towns and villages were entirely destroyed, and it is estimated that nearly one thousand lives were lost.

A RECENT number of the official organ of the National Department of Hygiene in Buenos Ayres, a copy of which has been sent to us, calls attention to a hygienic exhibition which is to be held in that city at the close of this month. The authorities hope that it may render important service in helping to establish a permanent museum of practical hygiene, besides stimulating public interest in sanitary questions generally. The journal also contains many useful notices of original work published in various foreign papers.

THE current numbers of the *British Medical Journal* and the *Lancet* should be obtained by everyone desirous of entering the medical profession. They are almost entirely devoted to descriptions of the universities, corporations, and colleges which grant the degrees and diplomas required by a medical practitioner. Prospective students will find our contemporaries complete guides to the medical calling. They will also find that to succeed in this noble profession it is necessary that a man "should be imbued with a love of humanity and a love of science, and should be indifferent to the worship of the god of the modern world—the golden calf. No man whose aim is to make a fortune should dream of entering the medical profession. Let him learn the grocery business or the drapery business; he will not only fail in medicine, but will help to degrade it." These remarks are applicable to students of most branches of science.

SOME years ago, an observatory was established on the Saint-Jacques tower in Paris, under the direction of M. J. Jaubert. The institution is of a private nature, but it is furnished with good instruments, and has from time to time issued useful bulletins. An interesting report upon the atmosphere of Paris is published in the supplement of *La Nature* of August 25, based on the observations made between July 1, 1891, and December 31, 1893, which shows very clearly the influence exerted on meteorological elements by a large mass of houses. M. Jaubert had compared the observations at his own observatory with those at the official observatory at Parc Saint-Maur, in the suburbs of Paris. The tables show that the variations of pressure between the two places are very small, but that temperature, especially towards the evening, is from 3° to 4° F. higher in the city, while the maxima and minima occur some hour or two later than in the country. The amount of cloud has this peculiarity, that during the evening the sky is clearer over Paris than in the suburbs. All other elements, rainfall, wind, &c., have been compared, and some interesting details as to visibility are also given. We published some time since (vol. xlix. p. 460) a similar comparison with reference to the temperature of Berlin. Such statistics are of great practical value, especially to persons living near large towns.

AMONG some of the old German legends concerning the weather, the recent meteorological conditions experienced in Göttingen and its neighbourhood have turned nearly everyone's mind to that very old one called the "seven sleepers," or "Die Siebenschläfer." That such a belief should still be held to these old legends is not to be wondered at, even in these days of forecasts, &c., for were they not to a great extent founded on real, although roughly observed, facts which had been noticed over the space of many years, and at last become legendised? The legend of the Siebenschläfer runs as follows:—Seven Christian youths, Maximianus, Malchus, Serapion, Dionysius, Johannes, Martinianus, and Konstantinus, in the reign of King Decius, 251, fled to the mountains because they would not follow the Jewish religion. In a mountain called Kalion, near Ephesus, they found a large cave, into which they entered, slept, and ultimately became shut in. It was not till the year 446, under the reign of Theodosius, that this cave was accidentally opened, and the seven sleepers woke up from their long sleep of nearly 200 years, Bishop Martin and the king being both witnesses to this wonder. The Christians died eventually surrounded with glory and honour. The saying which has come down to us to-day, and which, curiously enough, connects these holy men with the weather, is that, if it should rain on June 27, we must expect rain for the following seven weeks; this is for the Roman Church. In the Greek Church this day is held on August 4, while the "Acta Sanctorum" name July 27 for its remembrance. It may be of interest, however, to see whether the application of this old legend to the weather recently experienced holds good. Taking the Roman Church Calendar as our reckoning, and commencing on June 27, the seven weeks would then terminate on August 14. Unfortunately rain did not happen to fall on the 27th at the place in question, but records show that both the day before and after it was experienced. On the 29th and 30th also no rain fell, but with the exception of July 6, 29, and 30, rain has fallen daily until August 14. Thus from June 27 to August 14, both days inclusive, a period of 49 days, only six days were recorded without rain, but rain did *not* actually fall on the 27th. One infers from the legend that at the end of this period fine weather should be the order of the day, that is to say, if according to the "Sieben Brüdern" it did not rain on July 10. Unfortunately or not, as the case may be, 1·5mm. on 200 square cm. of rain were recorded, which means, according to the latter legend, that it must rain for seven weeks after this date. At the time of writing, August 24 (7 p.m. Central European time), it has rained daily since the 14th, so that the "Sieben Brüdern" seems as if it will be verified. The meteorological records referred to above we owe to Herr A. Spörhase, meteorological observer at the Physical Institute, Göttingen.

AT a recent meeting of the Société Française de Physique, M. Bouty read a paper on the capacity of the capillary electrometer. The author supposes that the two quantities of mercury are brought to a difference of potential e, and that the surface of the mercury in the capillary is brought back to the zero by increasing the pressure, and that a quantity of electricity dQ is then supplied without changing the pressure. The capacity of the apparatus, under these conditions, consists, according to Lippmann's theory, of two parts, one term proportional to the square of $\frac{dA}{de}$ where A is the surface tension and represents the quantity of electricity absorbed or produced by the change in the form of the small surface of mercury, and has the preponderating influence when e is nearly zero. The other term which is proportional to $-\frac{d^2A}{de^2}$ is only of importance when A is near its maximum. In order to measure the capacity C which is equal to $\frac{dQ}{de}$ the author measures separately the corresponding values of δQ and δe within such limits that proportionality exists between these quantities. He produces a constant quantity of electricity (δQ) by means of a piezo-electric piece of quartz, and discharges it into the electrometer, whose capacity may be considered as infinite compared to that of the quartz. He then determines by means of a derivation on the circuit of the charging battery the increase δe of the electromotive force necessary to reproduce the same shift in the mercury as was produced by δQ. In every case the observed values agreed with those deduced by means of Lippmann's theory.

M. W. SPRING, who about fifteen years ago proved the possibility of welding metallic bodies by simple pressure at temperatures far below their fusing point, publishes an interesting extension of his researches in the *Bulletin de l'Académie Royale de Belgique*. He was led to the conclusion that at a certain temperature, where a metal is to all appearances a perfect solid, a certain proportion of the molecules attain a rate of vibration corresponding to the liquid state, and that these molecules, by softening the body, make it capable of welding and of producing alloys with other metals. The metals were put in the shape of cylinders bounded by plane surfaces, upon the purity of which great care was bestowed. They were then mounted in a stirrup, and pressed together by means of a hand-screw. In this state they were placed in a heating oven, and kept at a constant temperature between 200° and 400° for from three to twelve hours. The most perfect joints were produced with gold, lead, and tin, and the worst with bismuth and antimony. Two cylinders thus welded together could be put in a lathe, one of them only being held in the chuck, while the other was being worked upon by a cutting tool, without coming apart. They could be separated with the aid of pincers, but then a rough breakage was produced which did not coincide with the original plane of separation. It appears that the more crystalline the bodies are the less do they exhibit this phenomenon of incipient liquefaction, which begins to show in the case of platinum, for instance, at 1600° below its fusing-point. That such a liquefaction or softening actually takes place was proved by cutting a delicate spiral 0·2 mm. deep on the end surface of a piece of copper weighing 130 grammes, and placing it upon a sheet of mica. After keeping it at 400° for eight hours, the spiral had entirely disappeared, and the surface looked as if just fused before the blowpipe. Where two metals were employed, alloys were formed, which, in the case of lead and tin, were fusible and flowed out at 180°. By placing a perforated disc of mica between the two, the outflow could be prevented, but the alloy formed at the centre and the metals were hollowed out in the proportion of their degrees of liquefaction. In a lead-antimony couple, the hole in the lead was 8 mm. or 9 mm., and that in the antimony 2 mm. The most striking and novel experiments, however, were those showing the evaporation of metals, or rather their sublimation, at temperatures between 300° and 400°. This was also shown by inserting a disc of mica, say, between a zinc and copper couple at 360°. When air was carefully kept away from the surfaces, the copper was tinted a golden yellow over the area of the hole in the mica, the exact colour of tombac, and a brown layer was produced on the zinc, which chemical analysis proved to contain copper. Similar results were obtained with cadmium, the thickness of the mica being 0·8 mm.

We have received a copy of the *Jahres-Bericht des Vereins für Naturkunde of Mannheim*, in which a brief account is given of the proceedings of the Society during the years 1889-93 inclusive. It appears that in spite of the population of Mannheim having doubled itself during the past eighteen years, the Society has not increased in numbers. That it should have maintained a bare existence must be considered very creditable to the energy of its members, for we read that Mannheim, as perhaps no other commercial or industrial centre, possesses so few attractions in the shape of social or scientific intercourse that the inhabitants as soon as they can retire from work leave the city to settle elsewhere. A similar nemesis unfortunately overtakes some of our local naturalist societies, and Mannheim cannot claim the unique position ascribed to it by the president of its Naturkunde Verein! The greater part of the pamphlet is occupied by an elaborate paper, by Dr. Migula, entitled "Methode und Aufgabe der biologischen Wasseruntersuchung." The endeavour is made to build up a bacteriological standard of purity for water, not according to the number of microbes, but from an estimation of the particular varieties present in a given sample of water. We are not surprised to find Dr. Migula willing to resign this herculean task to others to work out.

Mr. W. A. Sanford read before the Somerset Archæological and Natural History Society, at its late meeting at Langport, a paper in which he announced his discovery, in the Rhætic beds at Wedmore, of a large Dinosaur. The animal appears to have been carnivorous, and, though very much larger, to have resembled *Megalosaurus Bucklandi* of the Stonesfield slate. The remains at present available for study are about twelve vertebræ, a large portion of the pelvis, some portions of the mandible, some teeth, a nearly complete femur, parts of a tibia and of both fibulæ, some phalanges, including a perfect claw-bone, and fragments of ribs and of other small bones, and other larger fragments that may be placed. The bones are accompanied by fossils of Triassic date, which render their geological position a matter of nearly absolute certainty. The results of a complete and close examination of the bones will be of considerable interest.

In addition to a preliminary note on some new species of fish, belonging to the genera *Characodon* and *Atherinichthys*, from the Mexican Seas, by Dr. F. Steindachner, the June number of the *Proceedings* of the Imperial Academy of Science of Vienna (1894, No. xv. pp. 147-154) contains a communication from Prof. Weisner upon the results of a physiological investigation upon some interesting points in the germination of the mistletoe and its European and tropical allies (*Viscum* and *Loranthus*). The author finds a considerable difference between the seeds of the European and tropical forms as regards their reaction to light and moisture, and as to the existence or duration of a "resting period." These differences and peculiarities, however, he is in all cases able to interpret as specific adaptations to differences in the natural conditions of life. The viscid envelope of the seeds in all the parasitic species is undoubtedly an adaptation for ensuring the attachment of the seed to the bark of its host; but Prof. Weisner regards its great development in the common mistletoe (*Viscum album*) as also serving to retard the process of germination. There is practically no resting period in the case of the tropical species, and in them the viscid pericarp is developed in much smaller quantity; and the seeds of our own *Viscum album* germinate most readily when freed from their mucilaginous investment. It is to be hoped that Prof. Weisner will publish before long a fuller account of his interesting researches, and that he will also incorporate some statements as to the effects of temperature upon the germination of the same seeds.

In an elaborate paper "Étude expérimentale sur le charbon symptomatique" (*Annales de l'Institut Pasteur*), Dr. Duenschmann describes some extremely interesting and suggestive experiments which he has made on the effect of associating a virulent with a non-virulent micro-organism in animal inoculations. For this purpose the well-known bacillus *prodigiosus* was introduced into guinea-pigs along with the bacterium *Chauvœi*, the exciting cause of symptomatic anthrax. Under ordinary circumstances the latter microbe will kill guinea-pigs in eighteen hours, but, strange to say, its lethal action is delayed for four days, when it is associated with the *B. prodigiosus*. M. Roger already found that the rabbit, an animal not easily susceptible to symptomatic anthrax, may be readily infected if cultures of the *B. prodigiosus* are introduced along with the *B. Chauvœi*, and similar observations in the case of other disease microbes, associated with this harmless bacillus, have been made by others. Dr. Duenschmann, however, has carried his investigations still further, and has found that the *B. prodigiosus*, usually regarded as an innocent saprophyte, will, if used in sufficient quantities, kill guinea-pigs when introduced into the peritoneum. The chief interest of Dr. Duenschmann's experiments lies in the contribution which they afford to the important subject of the *associated* action of micro-organisms. The bacteriological study of disease has so far been mainly carried on with single varieties of microbes; but it must not be forgotten that in nature infection with a pure culture, or one variety of organism, is the exception and not the rule, and that in working with mixtures of micro-organisms we may obtain much important assistance in understanding the intricate and puzzling course run by so many diseases.

The annual report of the Russian Geographical Society for the year 1893 is so full, that only in a publication specially devoted to geography would it be desirable even to enumerate the headings of its varied contents. All we can do is to mention the parts which possess general interest. Such are the remarks of M. Obrucheff on the Eastern Gobi between Urga and Pekin, which has the characters of a steppe, but not of a desert, as it receives a regular amount of rain in the summer, and is covered then with grass, while true deserts are found in small limited portions only of its vast area. M. Obrucheff's find of a skull of a rhinoceros, probably *Tichorhinus*, in the lake deposits of the Ordos, in latitude 38° N., is also worth mentioning. E. G. Fritsche's measurements of the magnetic elements in the neighbourhood of Moscow, where an anomalous distribution had been observed, show that the anomaly is due to the presence, at a depth which is estimated at ten kilometres, of large iron masses. M. Komaroff's measurements of the movement of the Zerafshan glacier and the exploration of its former much greater extension, as also his levellings in the Transcaspian territory in the region which is supposed to have been the *Area Palus* of the ancients, promise to yield very interesting results. The yearly reports of both the East and the West Siberian Branches of the Geographical Society are also full of geographical information. In East Siberia, M. Prein has explored the vegetation of the Olkhon Island in Lake Baikal, which offers great interest for its curious mixture of species characteristic of the steppes with purely forest species, and which also contains a number of varieties, either unknown or intermediary between different formerly known varieties. In West Siberia, we notice the steady work of the Meteorological Committee which opened last year, in connection with the Central Meteorological Observatory, eight stations in different parts of the territory; M. Siyazoff's work on the flora of the Ishim Steppes, and its comparison with the flora of Tyumen, at the eastern slope of the Urals; M. Katanaeff's larger work on the Kirghiz Steppes; and Slovtsoff's, on the Pelym region and on the Siberian cedar—all published in the memoirs of the West Siberian branch—are also of interest.

A REPORT, showing the distribution and production of some of the most important minerals worked in India, has been issued by the Department of Revenue and Agriculture of the Indian Government.

THE principles of the manufacture of steel are ably described in "Fabrication de la Fonte," by M. E. de Billy, the volume being the latest addition to the Aide-Mémoire series published jointly by Gauthier-Villars and Masson.

THE fifth part of Kerner and Oliver's "Natural History of Plants" (Blackie) has been published. Its contents refer to metabolism and the transport of materials, and to the growth and construction of plants.

WE have received a paper "On the Analytical Treatment of Alternating Currents," read by Prof. A. Macfarlane before the International Electrical Congress held at Chicago a year ago, and reprinted from the Congress' *Proceedings*.

ALL regulations referring to the registration and inspection of classes held in connection with the City and Guilds of London Institute are given in the "Programme of Technological Examinations" just published for the Institute by Messrs. Whittaker and Co.

UNDER the title "Peregrinazioni Psicologiche," U. Hoepli, of Milan, has published a collection of psychological papers by Dr. Tito Vignoli, Professor of Anthropology in the R. Accademia Scienze e Lettere di Milano, and Director of the Museo Civico di Storia Naturale.

THE September number of *The Country Month by Month*, by Mrs. Owen and Prof. Boulger, appears to us to be better than some that have preceded it. The poet-naturalist will find the authors' descriptions of autumnal plant and bird life greatly to his liking. Some parts of the book are really very fine. Messrs. Bliss, Sands, and Foster are the publishers.

THE Manchester Microscopical Society, with a membership of 245, ranks high among provincial scientific societies. Several interesting papers are printed in the *Transactions* of the Society for 1893. Among these we note the address of the president, Prof. F. E. Weiss, on recent researches and speculations on the structure of protoplasm; a paper on modern views of the plant cell, by Mr. Thomas Hick; and one on the organic forms of silica, by Mr. W. Blackburn. A useful summary of information on the plans of growth and the forms of Foraminifera is contributed by Mr. E. Halkyard; and a survey of typical examples of some common microscopic fungi is given by Mr. A. T. Gillanders. These papers show that interest in the Society is still maintained.

THE Meteorological Sub-Committee of the Croydon Microscopical and Natural History Club is doing good work by the collection of rainfall statistics; its report for 1893 contains daily and monthly values for sixty-three stations in the counties of Kent and Surrey. The Hon. Sec., Mr. F. C. Bayard, points out that the smallness of the total rainfall during the year is very remarkable. The average yearly fall for Greenwich for seventy-five years (1816–90) is 25·11 inches; but in the year 1893 there was a deficiency of 5·02 inches, which quantity nearly represents the deficiency of the district dealt with by the Club. Most of this deficiency, viz. 4·77 inches, occurred during the first six months of the year.

THE additions to the Zoological Society's Gardens during the past week include a Diana Monkey (*Cercopithecus diana*) from West Africa, presented by Mr. Darent McDonald; a Pinche Monkey (*Midas œdipus*) from New Granada, presented by Lieut.-W. N. Gordon, R.A.; a Puma (*Felis concolor*) from Argentina, presented by Mr. Ponsonby Ogle; a Stone Curlew (*Œdicnemus scolopax*), British, presented by Colonel H. W. Fielden; two Poe Honeyeaters (*Prosthemadera novæ-zealandiæ*), from New Zealand, presented by Mr. Reginald Moorhouse; an Elephantine Tortoise (*Testudo elephantina*) from the Seychelles, presented by Mr. Arthur Gladstone; two Hawks-billed Turtle (*Chelone imbricata*) from the East Indies, presented by Captain E. Fleetham; a black-headed Lemur (*Lemur brunneus*) from Madagascar, five Meyer's Parrots (*Pœocephalus meyeri*) from East Africa; two Brown-throated Conures (*Conurus æruginosus*) from South America, deposited; two Javan Wild Swine (*Sus vittatus*) from Java, presented by Mr. E. J. Kerkhoven.

OUR ASTRONOMICAL COLUMN.

RECENT OBSERVATIONS OF MARS.—Mr. John Ritchie, jun., has kindly sent us a cutting from the Boston *Commonwealth* containing some observations of Mars, made at the Lowell Observatory, Arizona, since those recorded in our issue of August 16. The staff of the observatory includes Mr. Percival Lowell, Prof. W. H. Pickering, and Mr. E. A. Douglass. Mr. Lowell himself communicated the following observations to the *Commonwealth*: July 5. Both Pickering and Douglass observed that the terminator was flattened in a certain place. Light from the Sabacus Sinus was found to be polarised. July 19. Douglass observed a protuberance on the terminator, and a notch. The height of the former was estimated at 0″·1, which suggests an elevation of about five-eighths of a mile. July 20. The notch seen by Douglass was confirmed by Pickering. July 21. Douglass saw two notches which were afterwards confirmed by Pickering, July 23. Other notches on the terminator observed by Douglass. July 26. A large protuberance observed by Pickering. The light from the larger "lakes" found to be unpolarised, even when near the limb of the planet. (Mr. Ritchie points out that the projection seen by Pickering was in all probability the one seen by Javelle at Nice, on July 28). The first observation of a canal, Eumenides, was made on June 6 by Pickering. The same channel was seen by the other observers on June 7, and appeared persistently on June 9. During the whole of June and July the snow-cap diminished in size. On July 10, a minute patch of white, in the position of the former star-like points, was seen as a difficult object, entirely detached from the snow-cap. On July 18, Pickering reported that the cap had materially diminished, and that the canals were coming out more clearly. He had some views of clouds and glimpses of some of his "lakes." Early in August he reported that he had seen seventeen of these lakes, two of them new. By the end of June the canal Ganges was seen twice, and both times single. July 29, a light grey tint was seen on an extended region. Some canals were well developed, no duplication visible. July 30, early in the evening, with the seeing 4 and 3 on a scale of 10, Pickering thought he saw Ganges double. Later in the evening, when the seeing had improved to 8 and 9, it was evident that such was not the case. The